MERZHANOV, A. G.

"Problems of heat transfer in the heat-explosion theory."

report submitted for 2nd All-Union Conf on Heat & Mass Transfer, Minsk, 4-12 May 1964.

Inst of Chemical Physics, AS USSR.

ACCESSION NR: AP4041201 S/0207/64/000/003/0118/0125

AUTHORS: Barzy*kin, V. V. (Moscow); Gontkovskaya, V. T. (Moscow); Merzhanov, A. G. (Moscow); Khudyayev, S. I. (Moscow)

TITLE: Nonstationary theory of thermal explosion

SOURCE: Zhurnal prikladnoy mekhaniki i tekhnicheskoy fiziki, no. 3, 1964, 118-125

TOPIC TAGS: thermal explosion, heat transfer, Newtonian heat exchange, thermophysics, approximate formula

ABSTRACT: The authors use an electronic computer to analyze and solve a system of partial differential equations for thermal explosion for a reaction of zeroth and first order with conductive heat transmission in the reaction zone and Newtonian heat exchange on the boundary. They analyze

$$\frac{\partial \eta}{\partial \tau} = \gamma \varphi(\eta) \exp \frac{\theta}{1+\beta\theta} \quad \text{and} \quad \frac{\partial \theta}{\partial \tau} = \varphi(\eta) \exp \frac{\theta}{1+\beta\theta} + \frac{1}{\delta}\left(\frac{\partial^2 \theta}{\partial \xi^2} + \frac{n}{\xi}\frac{\partial \theta}{\partial \xi}\right) \quad (1)$$

$$\theta = \frac{E}{RT_0^2}(T - T_0), \quad \tau = \frac{QEk_0 t}{c\rho RT_0^2} \exp\left(-\frac{E}{RT_0}\right), \quad \xi = \frac{x}{r},$$

$$\delta = \frac{QEr^2 k_0}{\lambda RT_0^2} \exp\left(-\frac{E}{RT_0}\right), \quad \gamma = \frac{c\rho RT_0^2}{QE}, \quad \beta = \frac{RT_0}{E} \quad (2)$$

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ACCESSION NR: AP4041201

where Θ is heating, τ is time, ξ is a coordinate, δ is the criterion of Grank-Kamenetskiy, n = 0,1 and 2 respectively for plane-parallel, cylindrical, and spherical containers, η is the depth of transformation. The dimensionless variables are: T(x,t) - temperature in the reaction region, T_0 - temperature of the ambient medium, Q - thermal effect of the reaction, k_0 - pre-exponent, E - activation energy, λ - coefficient of heat conductivity, c - specific thermal capacity, ρ - density, R - universal gas constant, r - radius of the container (for plane-parallel - half of the thickness). The authors refine the determination of the basic characteristics of thermal explosion. They present the results in the form of approximate formulas relating the characteristics of thermal explosion with all the parameters of the problem in a wide range of variation. A criterion is given for applicability of the equation averaged over the region for computing the period of induction in the case of conductive heat transmission in the reaction region, and a method for averaging the system of equations for thermal explosion is proposed. Orig. art. has: 5 figures, 6 tables, and 9 formulas.

ASSOCIATION: none

SUBMITTED: 23Jan64 ENCL: 00

SUB CODE: TD NO REF SOV: 008 OTHER: 005

Card 2/2

L 8804-65 EPA/EPA(s)-2/EWT(m)/EPF(c)/EPR/EWP(j)/H Pc-4/Paa-4/Pr-4/Ps-4/Pt-10 SSD/AFWL/ESD/ASD(m)-3/AFTR/ETR/AEDC(b)/RAEM(t)/ESD(gs)/RPE WW/JW/JWD/RM

ACCESSION NR: AP4044705 S/0062/64/000/008/1509/1511

AUTHOR: Merzhanov, A. G.; Filonenko, A. K.

TITLE: Theory of reaction regimes in flames in the combustion of non-volatile condensed systems

SOURCE: AN SSSR. Izvestiya. Seriya khimicheskaya, no. 8, 1964, 1509-1511

TOPIC TAGS: combustion, explosive, pyroxiline, burning velocity, solid propellant

ABSTRACT: The length of the dark preflame zone (x_m) and the mass burning rate (u_m) were determined by combustion of pyroxiline samples (1 cm in diameter, 3—4 cm long) which were compressed to densities ranging from 0.8 to 1.5 g/cm^3. The experiments were conducted at 20—30 atm pressure in a constant pressure bomb filled with nitrogen. Evaluation of the experimental results (see Figs. 1 and 2 of the Enclosure) showed that the experimental data can be correlated by the previously derived theoretical relationship

$$x_m = u_m F(T_s)/pQ(p),$$

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ACCESSION NR: AP4044705

where $F(T_o)$ is a known temperature function at the beginning of the plateau in the flame temperature profile, Q(p) is the thermal effect of the reaction in the gas phase, and p is the pressure. Orig. art. has: 2 figures and 2 formulas.

ASSOCIATION: Institut khimicheskoy fiziki AN SSSR (Institute of Chemical Physics, AN SSSR)

SUBMITTED: 27Dec63 ATD PRESS: 3106 ENCL: 02

SUB CODE: WA, FP NO REF/SOV: 006 OTHER: 000

Card 2/4

L 8804-65

ACCESSION NR: AP4044705

ENCLOSURE: 01

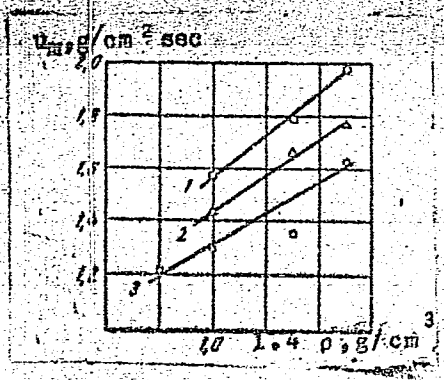

Fig 1. Dependence of the mass burning rate of pyroxiline on density at different pressures

1 - 30 atm; 2 - 26 atm; 3 - 21 atm.

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L 8804-65

ACCESSION NR: AP4044705

ENCLOSURE: 02

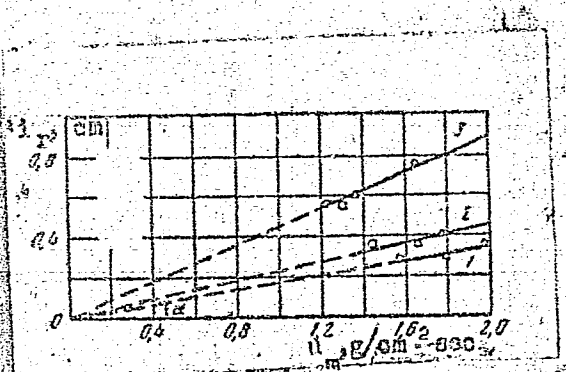

Fig 2. Dependence of the length of the dark zone on the mass burning rate at different pressures

1 - 31 atm; 2 - 26 atm; 3 - 21 atm; ▽ - ρ=0.8; □ - ρ=1; Δ - ρ=1.3; ○ - ρ= 1.5.

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L 16033-65 EPA/EPA(s)-2/EWT(m)/EPF(c)/EPR/EWP(j) Pc-4/Pr-4/Ps-4/Pt-10/Paa-4
RPL/APWL/SSD WW/JW/JWD/RM

ACCESSION NR: AP4049606 S/0076/64/038/011/2640/2647

AUTHOR: Barzy*kin, V. V. (Moscow); Merzhanov, A. G. (Moscow)

TITLE: Study of thermal explosion of condensed systems under conditions of low heat transfer from the surrounding medium

SOURCE: Zhurnal fizicheskoy khimii, v. 38, no. 11, 1964, 2640-2647

TOPIC TAGS: explosion, critical temperature, induction period, tetryl, dinitroxyethylamine

ABSTRACT: A method for determining from small samples (1-5g) the critical temperature and the induction periods of new explosives has been developed. Previous laboratory methods for determining the critical parameters from small samples using a directly thermostated reaction vessel gave inaccurate results. The method developed uses very low, heat-transfer coefficients on the order of 10^{-3} kcal/cm^2 sec·grad. The reaction vessel is equipped with two jackets. Water from a thermostat is circulated through the outer jacket, while the inner jacket is either evacuated or filled with air. The temperature

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L 16033-65

ACCESSION NR: AP4049606

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difference between the thermostat and the reaction vessel is recorded by a differential thermocouple. Experiments with tetryl, dinitroxyethylamine, and other explosives gave critical temperatures and induction periods which were in good agreement with data calculated by the steady- and quasi-steady-state theory of thermal explosion. The experimental values are therefore absolute and can be used for predicting properties at conditions differing from those of the experiment. Orig. art. has: 5 figures.

ASSOCIATION: Institut khimicheskoy fiziki AN SSSR (Institute of Chemical Physics, AN SSSR)

SUBMITTED: 31Oct63 ENCL: 00 SUB CODE: WA

NO REF SOV: 010 OTHER: 000 ATD PRESS: 3141

Card 2/2

ACCESSION NR: AP4042212 S/0020/64/157/002/0412/0415

AUTHOR: Maksimov, E. I.; Merzhanov, A. G.

TITLE: A model of burning of nonvolatile explosives

SOURCE: AN SSSR. Doklady*, v. 157, no. 2, 1964, 412-415

TOPIC TAGS: explosive, nonvolatile explosive, liquid explosive, solid explosive, theoretical burning model, combustion, propellant

ABSTRACT: Parr and Crawford's theory of burning of liquid explosives through the formation of foam in the condensed reaction zone (J. Phys. Coll. Chem., 54, no. 6, 1950, 927) has been further developed by theoretically treating the problem of the mechanism of dispersion during the burning of nonvolatile liquid and solid explosives. A single-stage model of the burning process is considered which takes into account reactions in the liquid phase with a large expansion in volume caused by the formation of foam, which is transformed into an aerosol. The reaction in the gaseous phase, the dissolution of the gaseous reaction products in the liquid phase, and the heat

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ACCESSION NR AP4042212

losses from the reaction zone are neglected. The heat capacity is assumed to be constant. The equation of state for an ideal gas is applied to the pressure in the foam bubbles and the aerosol. An approximate solution of the initial system of equations derived for the burning process with a large expansion in volume was obtained by using Zeldovich and Frank-Kamenskiy's assumption that the convective heat transfer in the reaction zone may be neglected. Numerical values of various parameters of the burning process were calculated on an electronic computer to verify the approximation. The data were in fair agreement with the theory. Thus, the proposed model may be used for calculating the burning velocities of liquid and melting, solid explosives. Orig. art. has: 2 figures, 1 table, and 6 formulas.

ASSOCIATION: Institut khimicheskoy fiziki Akademii nauk SSSR (Institute of Chemical Physics, Academy of Sciences SSSR)

SUBMITTED: 23Jan64 ATD PRESS: 3067 ENCL: 00

SUB CODE: WA, FP NO REF SOV: 009 OTHER: 002

Card 2/2

L 1563-65 EPA(s)-2/EWT(m)/EPF(c)/EPR/T Pad-4/Pe-4/Pt-10 ASD-3/AFFTC/SSD/
AFGC/ESD(gs)/RAE(g)/AEDC(a)/AEDC(b)/SSD/SSD(...)/BSD/AFWL/ASD(...)-3/AFETR/AFTC(p)
EW/AW/JWD/WE/RM

ACCESSION NR: AP4044888 S/0020/64/157/006/1427/1430

AUTHOR: Grigor'yev, Yu. M.; Maksimov, E. I.; Merzhanov, A. G. B

TITLE: Ignition of explosive particles in a hot gas

SOURCE: AN SSSR. Doklady*, v. 157, no. 6, 1964, 1427-1430

TOPIC TAGS: explosive, ignition, combustion, propellant, solid propellant, ignition delay

ABSTRACT: The ignition of spherical barium azide particles produced by abrasion of crystals on emery paper was studied at 260—650C in an assembly containing an electrically heated vertical glass tube into which a particle was introduced from the top and preheated air or nitrogen from the bottom. The falling speed of the particle could be controlled by regulating the countercurrent air flow. For shorter ignition delays a horizontal quartz tube was used. The ignition process was photographically scanned and a plot of ignition delay vs. temperature was obtained for different particle diameters (see Fig. 1 of the Enclosure). Each point represents the average of 15—20 measurements. The figure shows that the curves for different particle diam-

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eters intersect. The ignition delay increased with increasing particle diameter at higher temperatures. The particle radius (r_0) was correlated with the critical temperature $T_{0,cr}$ (the mean between the explosive and nonexplosive decomposition temperatures) by the following formula:

$$\ln \frac{T_{0\,cr}^2}{r_0^2}\left(1+\frac{\psi e_{10} T_{0\,cr}^3 r_0}{\lambda_{av}}\right)=\ln\frac{Qk_0Ee}{3R\lambda_{av}}-\frac{E}{R}\frac{1}{T_{0\,cr}},$$

where E = 35,000 cal/mole, $Qk_0 = 4{,}10^{15}$ cal/cm^3 sec, $\lambda_{av} = 10^{-4}$ cal/cm. sec deg, and $\psi = 4$ (E activation energy; Q, heat release rate; k_0, preexponential factor; λ, thermal conductivity; R, gas constant). With this formula, the critical temperature was plotted versus the radius in Fig. 2. Orig. art. has: 4 figures and 3 formulas.

ASSOCIATION: Institut khimicheskoy fiziki AN SSSR (Institute of Chemical Physics, AN SSSR)

L 15634-65
ACCESSION NR: AP4044885

SUBMITTED: 20Apr64 ENCL: 02 SUB CODE: WA

NO REF SOV: 008 OTHER: 002

Card 3/5

L 19634-65
ACCESSION NR: AP4044885

ENCLOSURE: 01

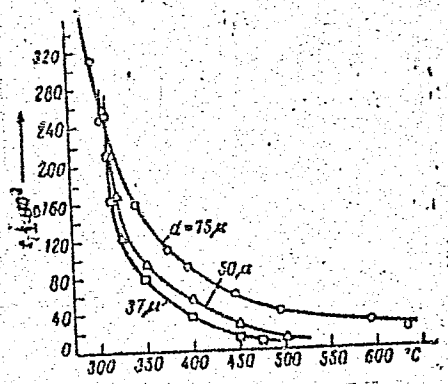

Fig. 1. Dependence of the ignition delay time of barium azide particles of different size on temperature in the range of 280—650C.

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L 15634-65
ACCESSION NR: AP4044885

ENCLOSURE: 02

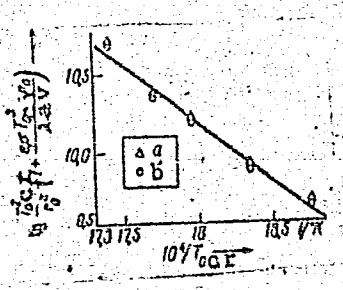

Fig. 2. Dependence $T_{o,cr}(r_b)$

$\varepsilon_1 = 1$; b - $\varepsilon_1 = 0$.

Card 5/5

L 6521-66 EWT(m)/EPF(c)/T/EWA(c) WE

ACC NR: AP5026027 SOURCE CODE: UR/0405/65/000/001/0059/0069

AUTHOR: Merzhanov, A. G. (Moscow); Strunina, A. G. (Moscow)

ORG: none

TITLE: Relationships of thermal explosion under heating at constant rate

SOURCE: Nauchno-tekhnicheskiye problemy goreniya i vzryva, no. 1, 1965, 59-69

TOPIC TAGS: thermal explosion, combustion, ignition, combustion theory, kinetics, reaction kinetics

ABSTRACT: A theoretical study has been made of thermal explosion with varying temperature of the surrounding medium. The parameters of thermal explosion were calculated for monomolecular, bimolecular, and autocatalytic reactions. Exact and approximate solutions were obtained by numerical integration and by pseudoisothermal approximation, respectively. A plot of explosion temperature vs the rate of heating showed that in monomolecular reactions, the explosion temperature decreases with increasing rate of heating to the critical value corresponding to static conditions. In autocatalytic reactions, depending on conversion, the explosion temperature either first increases and then decreases or it only increases. Orig. art. has: 2 figures, 23 formulas, and 5 tables. [PV]

SUB CODE: FP/ SUBM DATE: 02Nov64/ ORIG REF: 006/ ATD PRESS: 4139

Card 1/1

L 7703-66 EPA/EWA(j)/EWT(m)/EWP(f)/EWA(b)-2/EWA(c)/ETC(m) WW/JWD

ACC NR: AP5026031 SOURCE CODE: UR/0405/65/000/001/0093/0102

AUTHOR: Grigor'yev, Yu. M. (Moscow); Maksimov, E. I. (Moscow); Merzhanov, A. G. (Moscow)

ORG: none

TITLE: Relationships of ignition of homogenous explosive particles in hot gas

SOURCE: Nauchno-tekhnicheskiye problemy goreniya i vzryva, no. 1, 1965, 93-102

TOPIC TAGS: combustion, explosion, explosive, propellant, solid propellant, ignition

ABSTRACT: A theory of the kinetics of decomposition of nonvolatile explosive particles in a hot gas has been developed on the basis of a simple model which assumes that the exothermal reaction takes place on the surface of the condensed particle which does not undergo phase transformation or change of size in the pre-explosion period, that the spherical explosive particle enters a cavity filled with hot gas, that heat transfer inside the particle takes place by conduction and external heat transfer by conduction and radiation, and that convective transfer is absent. The analysis yielded expressions for the temperature profile in the gas and inside the particle, for the time required to heat the particle, and for the induction period. To verify the theoretical relationships, experiments were made with nitrocellulose-pyroxyline powder particles (50—150 μ particle size) in horizontal and vertical glass tubes. The ignition temperatures of 50 μ particles were 255C in air and 246C

Card 1/2

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L 7703-66

ACC NR: AP5026031

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in argon. This difference is attributed to the higher thermal conductivity of argon. Ignition delay times determined as a function of temperature were in good agreement with the theory. Orig. art. has: 9 figures. [PV]

SUB CODE: FP/ SUBM DATE: 18Dec64/ ORIG REF: 005/ OTH REF: 001/ ATD PRESS: 4141

Card 2/2

L 4519-66 EWT(l)/EWP(m)/EWT(m)/EPF(c)/EWA(d)/EWP(j)/T/FCS(k)/EWA(c)/EWA(l) RPL

ACC NR: AP5026067 WW/JW/WE/RM SOURCE CODE: UR/0405/65/000/002/0062/0068

AUTHOR: Lisitskiy, V. I. (Moscow); Merzhanov, A. G. (Moscow)

ORG: none

TITLE: Ignition of condensed substances by the flow of hot gases

SOURCE: Nauchno-tekhnicheskiye problemy goreniya i vzryva, no. 2, 1965, 62-68

TOPIC TAGS: explosive ignition, ignition theory, ignition delay/pyroxylin no 1

ABSTRACT: Previous studies of the ignition of condensed explosives by the flow of hot gases have not accounted for the heat exchange conditions. Therefore, a new apparatus was designed in which the heat exchange between the explosive and the gas is measured under controlled conditions. Ignition of cylindrical charges of pyroxylin No. 1, 0.06—1.8 cm in diameter d and with a density $\rho = 1.5$ g/cm^3, by the flow of hot gases (air, nitrogen, argon, or carbon dioxide) was studied at the gas temperature $T_0 = 250—370$C, gas velocity $u = 90—270$ cm/sec, $Re = 150—550$, and an ignition delay time $t_з = 15—95$ sec. The ignition delay was determined as a function of T_0, the temperature of the pyroxylin charge T_H, and the heat transfer coefficient α. Mathematical treatment of the experimental results within the similitude theory yielded

Card 1/2 UDC: 536.46

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ACC NR: AP5026067

the following expression for determining the dimensionless ignition delay time:

$$\tau_з = 0{,}016\theta_н^2 H^{-m},$$

where,

$$\theta_н = \frac{E}{RT_0^2}(T_0 - T_н); \quad H = \alpha\left[\frac{RT_0^2}{E}\frac{1}{Qk_0\lambda}\exp(E/RT_0)\right]^{1/2}; \quad \gamma = \frac{C\rho}{Q}\frac{RT_0^2}{E}.$$

Here, Q is the thermal effect; C, specific heat; E, activation energy; and m = 1.64. A graphical presentation of the experimental results in dimensionless coordinates shows that only under the following conditions $\tau_з(\infty) \ll \tau_з(H) \ll \tau_з(0)$, does the above equation correctly describe the ignition of pyroxylin by hot gases and is probably applicable for other condensed systems in which the ignition is not accompanied by phase transitions. Orig. art. has: 5 figures and 4 formulas. [PS]

SUB CODE: WA,FP, ME/SUBN DATE: 18Jan65/ ORIG REF: 003/ OTH REF: 005/ ATD PRESS: 4/30

Card 2/2

L 6420-66 EWT(1)/EWT(m)/EPF(c)/T/FCS(k)/EWA(c) WE

ACC NR: AP5026074 SOURCE CODE: UR/0405/65/000/002/0108/0114

AUTHOR: Strunina, A. G.; Merzhanov, A.G.; Mayofis, Z. B.

ORG: None

TITLE: Dynamic thermal explosion conditions. Part 2. Thermal condition regularities during constant rate cooling

SOURCE: Nauchno-teknicheskiye problemy goreniya i vzryva, no. 2, 1965, 108-114

TOPIC TAGS: heat of explosion, cooling rate, thermal explosion, explosion intensity

ABSTRACT: The first part of this paper (Nauchno-tekhnicheskiye problemy goreniya i vzryva, 1965, 1) investigated thermal explosion conditions during the heating of the surrounding medium. The present article studies these conditions for the case of cooling. The explosion pattern and its basic characteristics are studied. The derivation of the approximate solution to the problem, the results of numerical computer integration of an original system of equations, and a discussion of the critical heating rate, pre-explosion reaction intensity, pre-explosion heating, and of other pertinent parameters describing the events are given. The article concludes with a discussion of the application of the linear cooling method to the experimental study of the thermal explosion of strongly self-accelerating reactions. The authors thank A. S. Ukolov for several computations carried out during the investigation. Orig. art. has: 13 formulas, 5 figures, and 3 tables.

UDC: 541.126+536.46

Card 1/1 SUB CODE: WA,FP,TD / SUBM DATE: 23Nov64 / ORIG REF: 003

L 15870-66 EWT(l)/EWT(m)/EPF(n)-2/FCC/T/ETC(m)-6/EWP(n) WW/JW/JWD/WE
ACC NR: AP6004428 SOURCE CODE: UR/0414/65/000/003/0036/0040

AUTHOR: Strunina, A. G. (Moscow); Gontkovskaya, V. T. (Moscow); Merzhanov, A. G. (Moscow)

ORG: none

TITLE: Dynamic conditions of thermal explosion. III. Temperature field during heating and problems of the transition from spontaneous combustion to ignition

SOURCE: Fizika goreniya i vzryva, no. 3, 1965, 36-40

TOPIC TAGS: chemical explosion, combustion kinetics, temperature distribution

ABSTRACT: Equations for thermal explosion during heating are numerically solved with regard to temperature distribution. The paper is a continuation of previous studies (A. G. Merzhanov, A. G. Strunina, Scientific and Technical Problems of Combustion and Explosion, 1965, 1; A. G. Merzhanov, A. G. Strunina, Z. B. Mayofis, Scientific and Technical Problems of Combustion and Explosion, 1965, 2) and the notation is the same as that used in these articles. The problem was solved on a computer. Analysis of the numerical solution shows that ignition under dynamic heating conditions is completely analogous to the process under static conditions. The

UDC: 536.46+536.48

Card 1/3

ACC NR: AP6004428

basic parameter in defining the exchange conditions is the rate of heating ω. Curves are given showing nonstationary temperature profiles for a monomolecular reaction at a Biot number of infinity and various values of ω. Four regions are distinguished with respect to heating rate: 1. $\omega<\omega_*$ -- ignition does not take place; 2. $\omega_*<\omega<\omega'_*$ -- region of spontaneous combustion. For the case of heating close to the surface, a maximum is developed in the heating cycle which then moves to the center of the system (ignition starts at the center); 3. $\omega>\omega'_*$ -- the transition region for ignition conditions. The heating maximum does not reach the center, and ignition starts some distance away. As the heating rate is increased, the coordinate for generation of combustion moves toward the surface; 4. $\omega\gg\omega'_*$ -- the limiting region of ignition. A table is given showing the upper and lower critical heating rates for various Biot numbers. The data show that the spontaneous combustion region is considerably wider under dynamic conditions than for static processes. This is due to the fact that conditions for generation of a heating maximum are less favorable in the dynamic process because of the temperature increase on the surface of the system. The region of spontaneous combustion under dynamic conditions increases in latitude with a reduction in the Biot number. These data are compared with solutions disregarding temperature distribution. Curves are given based on both systems of equations for the temperature of onset of combustion as a function of heating

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ACC NR: AP6004428

rate. The curves show a divergence of only about 2°C throughout the entire region of spontaneous combustion. Thus temperature distribution may be disregarded in this region. Orig. art. has: 4 figures, 1 table, 4 formulas.

SUB CODE: 21/ SUBM DATE: 22Jan65/ ORIG REF: 004/ OTH REF: 000

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Card 3/3

L 9275-66 EWT(1)/EWP(m)/ETC/EPF(n)-2/EWG(m)/EWA(d)/ETC(m)/EWA(1) WW

ACC NR: AP5027270 SOURCE CODE: UR/0207/65/000/005/0045/0050

AUTHORS: Bostandzhiyan, S. A. (Moscow); Merzhanov, A. G. (Moscow); Khudyayev, S. I. (Moscow)

ORG: none

TITLE: Some problems on nonisothermal steady flow of a viscous fluid

SOURCE: Zhurnal prikladnoy mekhaniki i tekhnicheskoy fiziki, no. 5, 1965, 45-50

TOPIC TAGS: lubrication, liquid flow, lubricant viscosity, flow rate, flow temperature measurement, fluid mechanics, heat transfer

ABSTRACT: Three problems of unforced flows are studied: flow between two parallel plates, flow in an annular space between two infinite cylinders (axial flow), and flow between two rotating cylinders with account of energy dissipation and the variation of viscosity with temperature given in the Reynolds' equation

$$\mu = \mu_0 \exp(-\beta T),$$

Two types of boundary conditions are considered: a) on both surfaces the constant (and, in the general case, unequal) temperatures are given; and b) the constant temperature on one surface is given, and heat exchange with the surrounding medium occurs through the other. The case of flow between two parallel plates (given simply by $y = h$ and $y = -h$), one of which moves with a constant velocity V in the positive x - direction,

Card 1/2

L 9275-66

ACC NR: AP5027270

is described by the system

$$\frac{d}{d\eta}\left(e^{-\theta}\frac{dv}{d\eta}\right)=0, \qquad \frac{d^2\theta}{d\eta^2}+ke^{-\theta}\left(\frac{dv}{d\eta}\right)^2=0,$$

where dimensionless parameters are given as

$$v=\frac{v_x}{V}, \quad \theta=\beta(T-T_1), \quad \eta=\frac{y}{h}, \quad k=\frac{\beta\mu_0V^2}{\lambda J}\exp(-\beta T_1),$$

and boundary conditions as

$$v=1,\ \theta=0 \text{ for } \eta=1, \qquad v=0,\ \theta=\theta_0 \text{ for } \eta=-1,\ \theta_0=\beta(T_0-T_1).$$

J denotes the mechanical equivalent of heat, and λ is the fluid's coefficient of heat flow, and $T_0 > T_1$ (surface temperatures). An expression for velocity as a function of η and three constants of integration are determined from a transcendental system based on boundary conditions, and the Couette problem with isothermy is solved. The pattern of solution of the two remaining problems is analogous to that of the first, after account is made of the different flow and geometry conditions as expressed in the equations of motion and heat flow. Some special cases such as the case of equal cylinder temperatures and the insulation of one cylinder are discussed. A means of computing the torsional moment due to friction is given for the flow between two coaxial cylinders. Orig. art. has: 38 equations.

SUB CODE: 20/ SUBM DATE: 04Jan65/ ORIG REF: 010/ OTH REF: 002

Card 2/2

L 63085-65 EPA/EPA(s)-2/EWT(m)/EPF(c)/EWP(f)/EWA(c)/ETC(m) WW/JWD

ACCESSION NR: AP5020944 UR/0170/65/009/002/0245/0249
536.46

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6

AUTHOR: Averson, A. E.; Barzykin, V. V.; Merzhanov, A. G.

TITLE: Relationships for ignition of condensed explosives with ideal heat transfer at the surface and with allowance for burnup

SOURCE: Inzhenerno-fizicheskiy zhurnal, v. 9, no. 2, 1965, 245-249

TOPIC TAGS: solid propellant, combustion, propellant, ignition, ignition source, ignition alloy

ABSTRACT: An analysis is made of the ignition process taking place when a solid propellant is brought into contact with a solid heat source. It was assumed that a homogeneous, first order reaction takes place in the condensed phase in the presence of non-steady state heat transfer at the surface from the source. No allowance was made for phase transformations in the interior or on the surface of the propellant, individual kinetic and physical stages, dispersion of the condensed medium, etc. The propellant was assumed to be semi-infinite. The surface temperature of the source T_0 was assumed to remain constant. The spatial and temporal profiles of the temperature and conversion were obtained by electronic computation taking the dif-

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L 63085-65

ACCESSION NR: AP5020944

3

ference between the heat source and the propellant temperatures, $\beta = RT_0/E$ and $\gamma = c\rho RT_0^2/QE$ as parameters, where c is the specific heat; ρ, the density; E, the activation energy; R, the gas constant; and Q, the specific heat release. It was found that with a small γ (weak ignition source), the ignition process is self-accelerating and resembles a thermal explosion. As γ approaches the value of γ_{com} (γ during combustion), two different regimes with high conversion can be established depending on whether $\gamma > \gamma_{com}$ or $\gamma < \gamma_{com}$. The following additional conclusions are made: at low conversion, the reaction may be assumed to be of zero order. The ignition delay times calculated by a formula previously developed by Zel'dovich are in some cases about 50% lower than the actual values. Therefore, this formula cannot always be used. The width of the reaction zone under a normal regime is practically independent of the temperature difference between the source and the propellant. Orig. art. has: 9 formulas. [PV]

ASSOCIATION: Filial Institute khimicheskoy fiziki AN SSSR, Moscow (Branch of the Institute for Chemical Physics, AN SSSR)

SUBMITTED: 26Jan65 ENCL: 00 SUB CODE: FP

NO REF SOV: 003 OTHER: 002 ATD PRESS: 4074

Card 2/2

L 61694-65 EPA/EPA(s)-2/EWT(m)/EPF(c)/EWP(f)/EPR/EWP(j)/EWA(c) Pc-4/Pad-4/Pr-4/
Ps-4/Pt-7 RPL WW/JW/JWD/RM

ACCESSION NR: AP5017461 UR/0020/65/162/005/1115/1118

61
60
B

AUTHOR: Maksimov, E. I.; Merzhanov, A. G.; Kolesov, Yu. R.

TITLE: Density distribution in the combustion zone of condensed systems

SOURCE: AN SSSR. Doklady, v. 162, no. 5, 1965, 1115-1118

TOPIC TAGS: combustion, solid propellant, hexogen, combustion mechanism, condensed phase reaction

ABSTRACT: An experimental method based on x-ray absorption measurements was developed for determining the density profile at the burning surface of a solid propellant. The method applied to hexogen combustion at 0.5 to 5 atm showed that the density profile changes considerably with pressure and that the density change is gradual. The thickness of the zone in which the density changes can be calculated as a function of the propellant density by means of a formula derived. Motion picture photography showed that foam formed in the molten propellant layer leads to aerosol formation. Foam formation is attributed to the chemical reaction in the liquid melt rather than to passage of gases or to boiling of the overheated melt. The chemical conversion in the liquid phase was evaluated as 0.15—0.35. Comparing the velocity of the reaction front propagation with the burning velocity actually observed, it showed that the former is one order of magnitude smaller than the latter and that

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ACCESSION NR: AP5017461

the gas phase reaction must thus be the controlling step in the overall combustion process. The study reconfirmed a previous theoretical result that the density changes gradually and not stepwise. Values of the surface temperature, which are the basis for many combustion theories, should therefore be considered with reservations. Orig. art. has: 4 figures and 4 formulas. [PV]

ASSOCIATION: Institut khimicheskoy fiziki AKademii nauk SSSR (Institute of Chemical Physics, Academy of Sciences, SSSR)

SUBMITTED: 07Dec64 ENCL: 00 SUB CODE: FP

NO REF SOV: 006 OTHER: 001 ATD PRESS: 4039

Card 2/2

L 63803-65

ACCESSION NR: AP5018086 UR/0020/65/163/001/0133/0136

AUTHOR: Bostandzhiyan, S.A.; Merzhanov, A.G.; Khudyayev, S. I.

TITLE: Hydrodynamic thermal explosion

SOURCE: AN SSSR. Doklady, v. 163, no. 1, 1965, 133-136

TOPIC TAGS: hydrodynamic thermal explosion, exothermic reaction, thermal explosion, chemically inert fluid, viscous fluid, laminar flow, nonlinear temperature dependence, energy dissipation, nonlinear heat source

ABSTRACT: In the presence of an exothermic chemical reaction in a system there may arise conditions in which temperature progressively increases until the so-called thermal explosion takes place. By analogy with the above, the author shows that an effect similar to thermal explosion may take place during the flow of a chemically inert viscous fluid. This is illustrated with an elementary example: the stationary axially symmetric laminar flow of a viscous incompressible fluid of fixed density in an infinitely long round tube under the action of a fixed pressure gradient. The system of equations of motion and heat conduction, on taking into account energy dissipation, is presented and, for the particular case

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L 63803-65
ACCESSION NR: AP5018086

of fluids with a strong temperature-dependence of viscosity, reduced to the equation

$$\frac{d^2\theta}{d\xi^2}+\frac{1}{\xi}\frac{d\theta}{d\xi}+\chi e^{\theta/(1+\beta\theta)}=0.$$

which is identical with the equation of the stationary theory of thermal explosion (see, e.g. Frank-Kamenetskiy, D.A. ZhFKh, 13, no. 6, 738, 1939). Thus many of the inferences of this theory may be applied to the case considered here. Proceeding from this premise, the author derives formulas for the calculation of critical conditions of the hydrodynamic thermal "explosion" in the presence of Re numbers at which the flow is laminar. This is illustrated by the calculation of such critical conditions for glycerin at Re = 500. The differences between thermal "explosion" of chemical and of hydrodynamic origin are defined. Thus, during the flow of a viscous fluid, the liberation of heat ultimately corresponds to a zero-order "reaction" and the so-called "burnout" is absent. Furthermore, the maximum intensity of chemical sources of heat is present in the center of the system whereas for mechanical sources it is present near the surface. As a result, the stationary temperature profile in the hydrodynamic problem is flatter in the central layers and steeper in the surface layers. The overall findings thus indicate that in the case of a strong (nonlinear) temperature-dependence of viscosity owing to energy

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L 63803-65 2

ACCESSION NR: AP5018086

dissipation there may exist critical conditions of the thermal regime of fluid flow. Such conditions characterize many thermal problems with nonlinear heat sources (thermal breakdown of dielectrics, thermal explosion, etc.). Orig. art. has: 2 figures, 1 table, and 14 formulas.

ASSOCIATION: Filial Instituta khimicheskoy fiziki Akademii nauk SSSR (Affiliate of the Institute of Chemical Physics, Academy of Sciences, SSSR)

SUBMITTED: 07Dec64 ENCL: 00 SUB CODE: ME, TD

NO REF SOV: 008 OTHER: 000

Card 3/3

L 23275-66 EWT(m)/EPF(n)-2/T/EWP(t) IJP(c) JD/WW/JW/JWD/WE

ACC NR: AP6012523 SOURCE CODE: UR/0062/66/000/003/0422/0429

AUTHOR: Maksimov, E. I.; Grigor'yev, Yu. M.; Merzhanov, A. G.

ORG: Institute of Chemical Physics Academy of Sciences SSSR (Institut khimicheskoy fiziki Akademii nauk SSSR)

TITLE: The rules and mechanism of ammonium perchlorate combustion

SOURCE: AN SSSR. Izvestiya. Seriya khimicheskaya, no. 3, 1966, 422-429

TOPIC TAGS: ammonium perchlorate, combustion, solid propellant

ABSTRACT: The thermal decomposition of ammonium perchlorate (AP) is discussed extensively in the literature. PA sublimes on heating under high vacuum. Sublimation is suppressed with rising pressure and decomposition with evolution of heat takes place. Burning of PA occurs only at higher pressures. The purpose of this work was to investigate the nature of combustion of PA depending on temperature, pressure, particle size, density, and addition of ammonium chloride. Experiments were conducted in a constant-pressure bomb under nitrogen. The temperature was maintained by circulation of a thermostated liquid. The rate of combustion was determined photographically on a moving film. Technical grade PA was used; results obtained from PA purified by recrystallization differed by no more than experimental error (±4%). Samples were obtained by pressing PA which had been ground and graded according to size. Formation

UDC: 541.126+541.124

Card 1/4

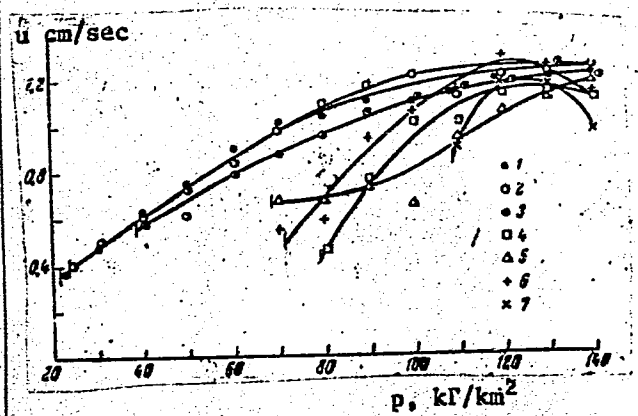

Fig. 1. Dependence of burning rate on pressure at 20C for particle sizes: 1 - 315—400; 2 - 250—315; 3 - 160—250; 4 - 100—160; 5 - 63—100; 6 - 50—63; 7 - less than 50 μ

and scattering of dispersed particles of PA were observed together with sublimation. The temperature factor of the rate of combustion

$$\alpha_p = \frac{1}{u}\left(\frac{\partial u}{\partial T_0}\right)_p$$

decreases with rising pressure and particle size, tending toward a saturation value.

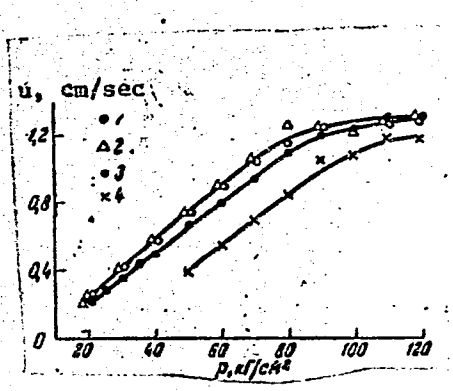

Fig. 2. Dependence of burning rate and pressure at 20C for particle sizes: 1 - 315—400; 2 - 250—315; 3 - 100—160; 4 - less than 50 μ

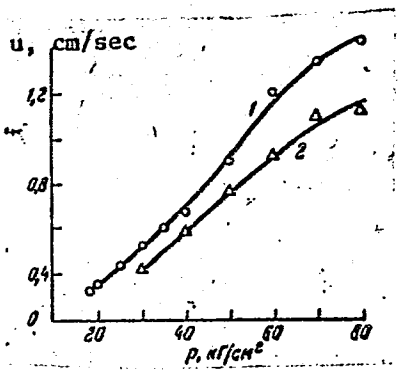

Fig. 3. Dependence of burning rate and pressure at 120C for particle sizes: 1 - 1.90; 2 - 1.5 g/cm^3

The data obtained led to the formulation of a mechanism which in a number of cases does not agree with the combustion theory of volatile substances developed by Belyayev and Zeldovich. The authors wish to thank G. B. Manelis and V. A. Strunin for

L 23275-66

ACC NR: AP6012523

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pointing out the part played by the reaction in the condensed phase in the course of PA combustion, and V. A. Linde, and Ye. I. Dmitriyeva for the chemical analyses. [VS]
Orig. art. has: 9 figures and 2 tables.

SUB CODE: 21/ SUBM DATE: 31Oct63/ ORIG REF: 010/ OTH REF: 005/ ATD PRESS: 4235

Card 4/4 ULR

L 23047-66 EWT(l)/EWT(m)/EWP(f)/EPF(n)-2/T/EEC(m)-6 WW/JW/WB

ACC NR: AP6012524 SOURCE CODE: UR/0062/66/000/003/0429/0437

AUTHOR: Abramov, V. G.; Goutkovskaya, V. T.; Merzhanov, A. G.

ORG: Institute of Chemical Physics, Academy of Sciences SSSR (Institut khimicheskoy fiziki Akademii nauk SSSR)

TITLE: The theory of thermal ignition. Communication 1. The rules of transition from autoignition to ignition

SOURCE: AN SSSR. Izvestiya. Seriya khimicheskaya, no. 3, 1966, 429-437

TOPIC TAGS: combustion, ignition, autoignition, propulsion

ABSTRACT: This paper is the second in a series attempting to evaluate analytically ignition and autoignition as limiting conditions of one and the same process. By analyzing the nonsteady state temperature field of a reacting system whose temperature is lower than that of the surrounding medium, the authors investigated the occurrence of ignition in a broad range of parameters. The upper limits of autoignition were determined. The possibility was demonstrated of dividing the total ignition delay time into an induction period and a period of heating of the entire region of autoignition. The influence of the geometry of the system on the ignition parameters is evaluated in detail. The transition from autoignition to ignition was studied for an infinite-cylinder model. Orig. art. has: 3 tables and 7 figures. [VS]

SUB CODE: 21/ SUBM DATE: 31Oct63/ ORIG REF: 004/ OTH REF: 003/ ATD PRESS: 4234

Card 1/1 FW UDC: 536.46

L 21485-66 EWT(m)/T/EWP(t) IJP(c) WW/JW/JD/WE

ACC NR: AP6008096 SOURCE CODE: UR/0076/66/040/002/0468/0470

AUTHOR: Maksimov, E. I.; Merzhanov, A. G.; Shkiro, V. M. 48 B

ORG: Branch of the Institute of Chemical Physics, Academy of Sciences SSSR (Filial Instituta khimicheskoy fiziki Akademii nauk SSSR)

TITLE: Self-ignition of thermite mixtures

SOURCE: Zhurnal fizicheskoy khimii, v. 40, no. 2, 1966, 468-470

TOPIC TAGS: ignition temperature, thermite mixture, activation energy

ABSTRACT: The previously described method for studying thermal explosions (A. G. Merzhanov, V. G. Abramov, F. I. Dubovitskiy, Dokl. AN SSSR, 128, 1238, 1959; V. V. Barzykin, A. G. Merzhanov, Zh. fiz. khim. 38, 2640, 1964.) was modified and used for investigating the reaction kinetics and self-ignition temperature of a thermite mixture consisting of Fe_2O_3 52.5, Al 17.5, and Al_2O_3 30%. The mixture was pressed to form cylindrical specimens with a constant length to diameter ratio l/d = 0.2, a density $\rho \simeq 2.3$ g/cm^3, and a thickness varying from 0.095 to 0.320 cm. The specimen was immersed in molten Pb and heated in an electric furnace. The temperature at which a "surf" appeared on the lead surface was found to be the critical self-ignition temperature of the thermite specimen. The critical temperature decreased as the thickness of the specimen increased from 810C for a 0.095 cm thick specimen to 676C for a 0.320 cm thick specimen. The activation energy and the rate of the

Card 1/2 UDC: 541/.545

L 21485-66

ACC NR: AP6008096

heat of reaction were calculated to be 40,000 cal/mole and 4.5×10^8 cal/g-sec, respectively. Since there is no gas evolution during a thermite reaction, thermite mixtures may be used as simple models for studying thermal explosions and the self-ignition of condensed systems. Orig. art. has: 2 figures, 1 table, and 4 formulas. [PS]

SUB CODE: 19/ SUBM DATE: 05Jan65/ ORIG REF: 007/ ATD PRESS: 4218

Card 2/2

L 22814-66 EWT(m) WW/JWD

ACC NR: AP6011501 SOURCE CODE: UR/0414/65/000/004/0024/0030 55 B

AUTHOR: Maksimov, E. I. (Moscow); Merzhanov, A. G. (Moscow); Shkiro, V. M. (Moscow)

ORG: none

TITLE: Gasless compositions as the simplest combustion model for nonvolatile condensed systems

SOURCE: Fizika goreniya i vzryva, no. 4, 1966, 24-30

TOPIC TAGS: solid propellant, combustion, combustion instability

ABSTRACT: Condensed phase reactions are of fundamental importance for studying solid propellant combustion. However, the presence of gasification processes and gas-phase reactions affects the combustion mechanism so that the characteristics of the condensed-phase reactions can be studied only with a model mixture in which no gases are formed. Most of the known thermits have been found to be unsuitable for this purpose since they all exhibited a considerable pressure effect on the burning velocity, thus indicating the presence of gas-phase reactions. Therefore, to formulate a thermit which would react only in the condensed phase, a mixture of 25% Al and 75% Fe_2O_3 was diluted with various amounts of Al_2O_3 so that the burning temperature was lowered

Card 1/3 UDC: 536.46+541.427.6

below the boiling temperatures of any of its components or products. These mixtures were compacted to densities in the range of $0.1 < \rho/\rho_{max} < 0.7$ ($\rho_{max} = 4$ g/cm^3). Tests showed that the burning velocity was fully independent of pressure as predicted. The maximum burning temperature vs. the burning velocity curve was linear, but at about 2600K it had a break which is attributed to the onset of the boiling of aluminum. The burning velocity vs. density curve had a characteristic minimum. This is attributed to the effect of the thermal diffusivity since the burning velocity vs. the thermal diffusivity curve had the same characteristic. The burning velocity was independent of particle size which indicates that the process is not diffusion controlled, but rather it occurs in a purely kinetic regime. The burning velocity can therefore be described by the following formula derived from the thermal combustion theory:

$$u_{1z}^2 = a \frac{c}{Q(1-\eta)} \cdot \frac{RT_m^2}{E} K_0 \exp\left(-\frac{E}{RT_m}\right),$$

where a is the thermal diffusivity; R, gas constant; K_0, pre-exponential factor; E, activation energy; Q, thermal effect of the reaction of a stoichiometric mixture in the liquid state; c, mean heat capacity; and η is the dilution factor. The experimental results were in good

L 22814-66
ACC NR: AP6011501 O

agreement with values calculated by this formula. Therefore, it can be used for calculating the kinetic parameters E and K_0, which were calculated to be 130 kcal/mole and 10^{15} ℓ/sec, respectively, for the mixture tested. It is concluded that the tested model mixture can be used for further studies of complex combustion processes which also involve gas phase reactions. Orig. art. has: 2 formulas and 7 figures. [PV]

SUB CODE: 21/ SUBM DATE: 27Mar65/ ORIG REF: 015/ OTH REF: 003
ATD PRESS: 4229

Card 3/3

L 23274-66 EWT(m) WW/JW/JWD

ACC NR: AP6012677 SOURCE CODE: UR/0170/66/010/004/0482/0486

AUTHOR: Shteynberg, A. S.; Ulybin, V. B.; Barzykin, V. V.; Merzhanov, A. G.

ORG: Branch of the Institute of Chemical Physics, AN SSSR, Moscow Oblast (Filial Instituta khimicheskoy fiziki AN SSSR)

TITLE: Ignition of condensed substances at a constant surface temperature

SOURCE: Inzhenerno-fizicheskiy zhurnal, v. 10, no. 4, 1966, 482-486

TOPIC TAGS: ignition delay, condensed explosive, surface temperature, pyroxylin

ABSTRACT: To verify the previously postulated theory of the ignition of condensed explosives (Averson, A. E., Barzykin, V. V., Merzhanov, A. G. IFZh, 9, No. 2, 1965), the ignition of pyroxylin No. 1 charges having a constant initial surface temperature (T_i = 255—369K) by contact with an aluminum block with a varying temperature (T_0 = 485—525K) was studied experimentally using a specially developed experimental unit (see Fig. 1). The initial temperature of the pyroxylin was set by a thermostat, and the temperature of the igniter was set by a current control system. The ignition delay t_g was visually observed

Card 1/4 UDC: 536.46

L 23274-66
ACC NR: AP6012677

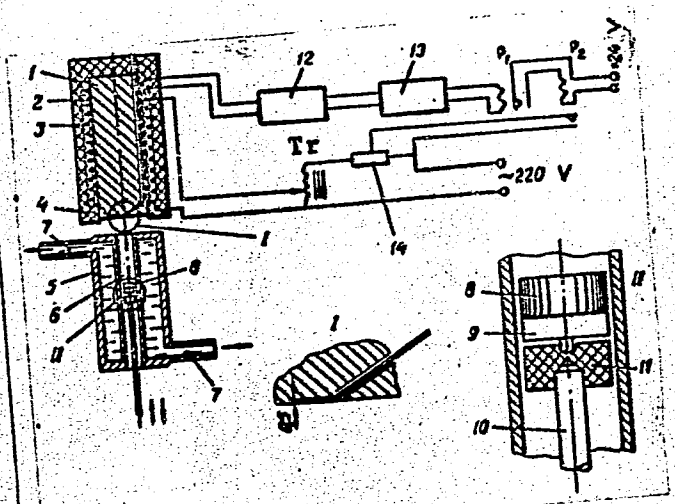

Fig. 1. Experimental unit for studying the ignition of condensed explosives by a hot body

1 - Aluminum block (igniter); 2 - Pt resistance thermometer; 3 - heating element; 4 - Pt—Pt-Rh thermocouple; 5 - thermostat; 6 - steel cylinder; 7 - jacket with heat transfer agent; 8 - charge; 9 - textolite plate; 10 - lifting device; 11 - ebonite sleeve; 12, 13, 14 - current control system; Tr - transformer.

Card 2/4

L 23274-66

ACC NR: AP6012677

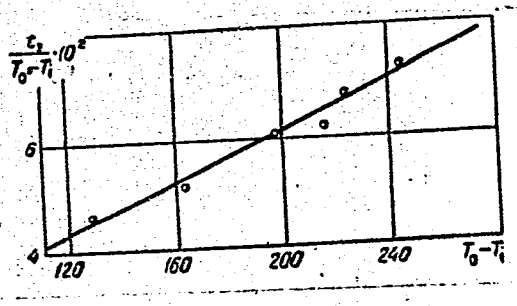

Fig. 2. Dependence of the ignition delay time on the initial temperature

(t_z in sec; T_0-T_i in °K; T_0 = 489K)

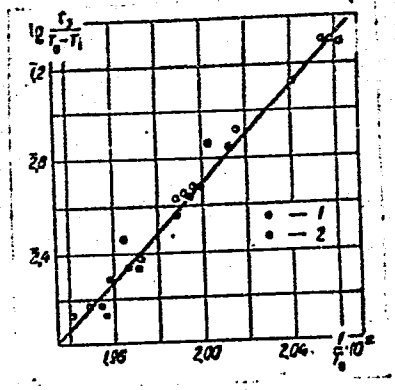

Fig. 3. Dependence of the ignition delay time on the temperature of the igniter

1 - Explosive charge 12 mm in diameter; 2 - charge 18 mm in diameter; (t_z in sec; T_0 in °K; T_i = 293—298K)

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L 23274-66

ACC NR: AP6012677

and recorded using a stopwatch. The temperature of the ignition block was varied to obtain an ignition delay of 3—20 sec. The experimental data were treated by an equation derived by mathematical transformation of the published theoretical equation for t_z. The graphed results (see Fig. 2 and Fig. 3) show satisfactory agreement between the theoretical and the experimental data. The activation energy calculated from the graphs was found to be 200 kj/mole. The authors thank B. M. Dmitriyev and O. A. Kochetov for their assistance in setting up the apparatus. Orig. art. has: 3 figures and 3 formulas. [PS]

SUB CODE: 19/ SUBM DATE: 31Aug65/ ORIG REF: 004/ ATD PRESS: 4235

Card 4/4 UVR

L 33436-66 EWT(m)/EWP(j)/T DS/WW/JW/JWD/WE/RM

ACC NR: AP6020552 SOURCE CODE: UR/0414/66/000/001/0047/0058

AUTHOR: Maksimov, E. I. (Moscow); Merzhanov, A. G. (Moscow)

ORG: none

TITLE: Theory of combustion of condensed substances

SOURCE: Fizika goreniya i vzryva, no. 1, 1966, 47-58

TOPIC TAGS: condensed substance, combustion theory, vinyl nitrate polymer

ABSTRACT: A quantitative theory is proposed for the combustion of homogeneous, nonvolatile condensed systems (liquids or solids which melt during the combustion). The following physical model is considered: the reaction determining the combustion rate occurs in the liquid phase with the formation of gaseous and solid combustion products; the gas is evolved in the form of bubbles, whose number and size increase with the reaction time to form a froth which is subsequently transformed into an aerosol. It is assumed that there is either no reaction between the gaseous decomposition products or the reaction has no effect on the combustion velocity in the liquid phase. It is also assumed that in the reaction zone, the initial substance and the products of its decom-

Card 1/2

UDC: 536.46

L 33436-66

ACC NR: AP6020552

position have the same velocity in the froth and in the aerosol. The pressure within the bubbles in the froth is close to the external pressure. Equations of state, heat capacity, thermal conductivity, and first order reaction kinetics were written for this model and used to derive a system of equations describing the combustion process. The system of equations was solved numerically on an electronic computer and experimental determination of combustion parameters of poly(vinyl nitrate) was made to verify the proposed theory. The combustion velocity of poly(vinyl nitrate) was measured as a function of pressure (0—100 atma), initial temperature (0—90°), and density of the initial compound. Microscopic studies were also made of the surface of poly(vinyl nitrate) specimens which were extinguished after a certain period of burning. The calculated data are in good agreement with the experimental data. The author thanks B. M. Andryukhin and A. A. Tkachenko for their aid in conducting the experiment. Orig. art. has: 7 figures and 2 tables.

[PS]

SUB CODE: 21/ SUBM DATE: 14Nov65/ ORIG REF: 014/ OTH REF: 003/

ATD PRESS: 5023

Card 2/2

ACC NR: AP6029750 (A) SOURCE CODE: UR/0414/66/000/002/0003/0009

AUTHOR: Strunina, A. G. (Moscow); Abramov, V. G. (Moscow); Merzhanov, A. G. (Moscow)

ORG: none

TITLE: Dynamic regimes of a thermal explosion. IV. Experimental investigation of the thermal explosion of some substances

SOURCE: Fizika goreniya i vzryva, no. 2, 1966, 3-9

TOPIC TAGS: thermal explosion, tetryl, nitrocellulose, critical heating rate, critical temperature, HEAT TRANSFER COEFFICIENT, HEATING

ABSTRACT: The theoretical principles of thermal explosion postulated in previous studies of this series are verified by experiments with heating and cooling of tetryl, nitrocellulose, and DINA charges in a reaction vessel with a low heat-transfer coefficient and with a linear temperature increase in the surrounding medium. For tetryl charges with a 0.8 cm diameter and a critical temperature of 146C, the heating rate varied between 0.8 and 17.4°/hr. The explosion occurred only at heating rates above the critical heating rate (2.4°/hr); at heating rates below the critical, tetryl decomposed without an explosion. When the heating rate increased from 0.8 to 1.9°/hr, the maximum temperature increased from 5.8 to 12.2C. The critical explosion temperatures for the three explosives are given for various heating and cooling rates. Orig. art. has: 4 tables, 5 figures, and 3 formulas. [PS]

SUB CODE: 19/ SUBM DATE: 19Jan66/ ORIG REF: 009/ OTH REF: 001/ATD PRESS:5066

Card 1/1 UDC: 541.427.6

L 38923-66 EWT(m)/T/EWP(t)/ETI IJP(c) JAJ/JD

ACC NR: AP6013907 SOURCE CODE: UR/0076/66/040/004/0811/0817

AUTHOR: Merzhanov, A. G.; Durakov, N. I.; Ikryannikov, N. P.; Abramova, L. T.

ORG: Institute of Chemical Physics, Academy of Sciences SSSR (Institut khimicheskoy fiziki Akademii nauk SSSR)

TITLE: Theory of thermography of phase transformations

SOURCE: Zhurnal fizicheskoy khimii, v. 40, no. 4, 1966, 811-817

TOPIC TAGS: thermographic analysis, phase transition, thermogram

ABSTRACT: In this article the authors develop a macrokinetic theory of phase transformations applicable to conditions of the thermographic method and perform an experimental check of the theoretical relationships obtained. The problem is formulated on the basis of two main approximations: 1) the thermophysical aspect of the problem in which the examination is limited to the case of conductive heat transfer in both phases (polymorphous transformations and certain melting conditions when convection in the liquid phase does not occur or is negligible); and 2) the conditions of phase transformations are examined in which there is a mobile, distinctly pronounced phase boundary whose rate of travel is determined by heat transfer.

Card 1/2 UDC: 541.11

ACC NR: AP6013907

The authors use an infinitely long cylinder filled with the investigated substance placed in a vessel whose temperature increases linearly. The initial temperatures of the medium and substance are equal (and below the temperature of the phase transition). Heat exchange with the ambient medium occurs according to Newton's law (boundary conditions of the third kind). The problem is to determine the nonstationary temperature field during phase transition and the various characteristics of the process (time of phase transition, thermograms, etc.). Utilizing an electronic computer the authors solved the macrokinetic problem of the occurrence of the phase transition for the cylindrical case with boundary conditions of the third kind with a linear temperature increase of the ambient medium. The results of analysis of the mechanisms of the phase transformation are used to construct a quantitative theory of thermography. Formulas are derived which permit determining the heat of phase transformation from the differential thermograms (with respect to the depth or area of the effect) and these formulas are experimentally checked. Orig. art. has: 2 tables, 2 figures, and 8 formulas.

SUB CODE: 20/ SUBM DATE: 06Jan65/ ORIG REF: 008

Card 2/2

L 37710-66 EWP(j)/EWT(m)/T RM/WW/JW/JWD

ACC NR: AP6024416 SOURCE CODE: UR/0020/66/169/001/0158/0161

AUTHOR: Averson, A. E.; Barzykin, V. V.; Merzhanov, A. G.

ORG: Institute of Chemical Physics, Academy of Sciences SSSR (Institut khimicheskoy fiziki Akademii nauk SSSR)

TITLE: Thermal theory of ignition of condensed substances

SOURCE: AN SSSR. Doklady, v. 169, no. 1, 1966, 158-161

TOPIC TAGS: ignition theory, condensed system, ignition ~~delay~~ lag, ignition, computer calculation

ABSTRACT: Generalized equations are derived for the ignition of condensed systems under various boundary conditions, i.e., at a constant surface temperature, a constant heat flux to the surface of the combustible, and under the conditions of Newtonian heat-exchange on the surface of the condensed system. The numerical solution of the derived system of equations on an electronic computer yielded a generalized equation for calculating the ignition delay of condensed systems over a wide range of parameters. Ignition parameters calculated by the proposed theory are in good agreement with both published theories and published experimental data obtained for the ignition of pyroxylin (V. I. Lisitskiy, A. G. Merzhanov, Nauchno-tekhnich. problemy goreniya i vzryva, no. 2, 1965). The authors thank Z. S. Andrianova for programming the electronic computer calculations. Orig. art. has: 1 table, 2 figures, and 6 formulas. [PS]

SUB CODE: 21/ SUBM DATE: 17Sep65/ ORIG REF: 005/ OTH REF: 004/ ATD PRESS: 5041

Card 1/1 UDC: 536.46

L 06524-67 EWT(1)/EWT(m)/EWP(m) WW/JW
ACC NR: AP7000471 SOURCE CODE: UR/0074/66/035/004/0656/0683

MERZHANOV, A. G., DUBOVITSKIY, F. I., Institute of Chemical Physics, Academy of Sciences USSR (Institut khimicheskoy fiziki AN SSSR) 44 B

"Modern State of the Theory of Thermal Explosion"

Moscow, Uspekhi Khimii, Vol 35, No 4, 1966, pp 656-683

Abstract: A survey is presented of the present day state of the theory of thermal explosion and means for its further development. The generalization and development of the classical theory of thermal explosion, including treatments of thermal explosion as one of the systems of ignition, the steady-state theory of thermal explosion, the nonsteady-state theory of thermal explosion, and the quasisteady-state theory of thermal explosion, are discussed. Systems of thermal explosion not described by the classical theory are reviewed: dynamic systems of thermal explosion with heating and cooling, thermal explosion in the presence of conductive heat transfer in the surrounding medium, focal systems of thermal explosion, and hydrodynamic problems of the theory of thermal explosion. Methods of experimental investigation and problems of verifying the theory are discussed, as is the mechanism of thermal explosion in condensed media. In the latter section, the physicochemical aspects of the mechanism of thermal explosion are discussed, including the influence of bulk gas evolution during decomposition upon the

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0923 1178

L 06524-67

ACC NR: AP7000471

occurrence of processes of thermal explosion, the thermal explosion of volatile substances, the thermal explision of solid organic substances, and thermal explosion in the presence of polymorphic transformations. Orig. art. has: 11 figures, 4 formulas, and 5 tables. [JPRS: 37,177]

TOPIC TAGS: thermal explosion, ignition

SUB CODE: 21/ SUBM DATE: none / ORIG REF: 055 / OTH REF: 020

Card 2/2

ACC NR: AP7000046 SOURCE CODE: UR/0207/66/000/005/0017/0024

AUTHOR: Grigor'yev, Yu. M. (Moscow); Merzhanov, A. G. (Moscow); Pribytkova, K. V. (Moscow)

ORG: none

TITLE: Critical conditions of thermal explosion with conductive heat transfer in the reaction zone and surrounding medium (conjugate problem)

SOURCE: Zhurnal prikladnoy mekhaniki i tekhnicheskoy fiziki, no. 5, 1966, 17-24

TOPIC TAGS: thermal explosion, critical explosion condition, conductive heat transfer, physical chemistry theory

ABSTRACT: A study was made of the critical conditions of the thermal explosion of bodies having different geometrical shapes (indefinite plate of finite thickness, cylinder of infinite length and finite radius, and sphere), located in an indefinite medium in the presence of conductive heat transfer both in the internal and external regions (conjugate problem). An analysis was made of the external problem of the theory of thermal conductivity for the case involving constant temperature of the interface between the media. It was shown that, in the

ACC NR: AP7000046

cases of plane and cylindrical symmetry, the existence of critical conditions for the thermal explosion is associated with the "burning out" of the substance in the preexplosion period, which takes place in the case of a nonzeroth order reaction. There exist no critical conditions for those shapes in the case of a zeroth order reaction. In the case when the temperature of the interface undergoes random variations, the conjugate problem is reduced to a boundary value problem; in this case, the criterial analysis method makes it possible to establish integro-differential equations for heat fluxes across the surface of the body. Integro-differential equations were used for the criterial analysis of the system, and for the analysis of limiting cases of ideal heat transfer (boundary conditions of the first gender) and of the absence of temperature distribution in the reaction zone. Calculations of the critical conditions of the thermal explosion were carried out on an electronic computer, and the results were processed in the criterial form. The critical conditions of the thermal explosion of the system, initial substance — surrounding medium, were calculated under different specific conditions. The special features of the thermal explosion were analyzed for the case of conductive external heat removal. It was shown that in the vicinity of critical conditions a quasi-stationary thermal regime holds for the reaction because of a decrease in time of the effective external heat transfer coefficient. The authors thank B. I.

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ACC NR: AP7000046

Khaykin and V. V. Barzykin for valuable advice. Orig. art. has: 7 figures.

[W. A. 68]
[BO]

SUB CODE:20,21/ SUBM DATE: 25Jul65/ ORIG REF: 010/ OTH REF: 003

Card 3/3

L 29921-66 EWT(1)/EWT(m)/ETC(f)/T WW/JW/JWD/WE

ACC NR: AP6017874 SOURCE CODE: UR/0062/66/000/005/0823/0827

60
B

AUTHOR: Abramov, V. G.; Gontkovskaya, V. T.; Merzhanov, A. G.

ORG: Institute of Chemical Physics, Academy of Sciences SSSR (Institut khimicheskoy fiziki Akademii nauk SSSR)

TITLE: The theory of thermal ignition. Communication 2. The effect of external heat transfer on ignition characteristics

SOURCE: AN SSSR. Izvestiya. Seriya khimicheskaya, no. 5, 1966, 823-827

TOPIC TAGS: ignition, combustion, thermal ignition

ABSTRACT: An analysis has been made of the effect of heat transfer through the walls of a vessel on the ignition characteristics of a gas reacting mixture. The reaction was assumed to be of zero order. The calculations were made for Biot numbers in the range from 0.01 to 100. Plots of the non-steady state temperature profiles showed that with decreasing Bi, the region of self-ignition is considerably expanded, but at very low Bi ignition is impossible. The induction period near the upper self-ignition limit approaches, with decreasing Bi, a value which corresponds to an adiabatic regime. Formulas were obtained for calculating the heating periods and also the minimum ignition delay time. Orig. art. has: 6 figures. [PV]

SUB CODE: 21/ SUBM DATE: 13Jan64/ ORIG REF: 002/ OTH REF: 001/ ATD PRESS: 5011

Card 1/1 CC UDC: 541.126+543.873

ACC NR: AT6032002 SOURCE CODE: UR/0000/66/000/000/0259/0272

AUTHOR: Merzhanov, A. G.

ORG: Branch of the Institute of Chemical Physics, AN SSSR (Filial Instituta khimicheskoy fiziki AN SSSR)

TITLE: The problem of heat transfer in the theory of thermal explosion

SOURCE: Teplo- i massoperenos, t. 4: Teplo- i massoobmen pri khimicheskikh prevrashcheniyakh v tekhnologii (Heat and mass transfer, v. 4: Heat and mass transfer during chemical transformations). Minsk, Nauka i tekhnika, 1966, 259-272

TOPIC TAGS: thermal explosion theory, heat transfer, ignition, induction period, ignition point

ABSTRACT: This review covers the heat-transfer considerations in the theory of thermal explosion in solid and liquid explosives, including the equations for determining self-ignition and induction period, boundary conditions, transition from self-ignition to ignition, and the explosion point. Orig. art. has: 1 table, 10 figures, and 2 formulas.

SUB CODE: 19/ SUBM DATE: 25Apr66/ ORIG REF: 013

Card 1/1

MERZHANOV, A.K., red.; BORUNOV, N.I., tekhn. red.

[Guiding instructions on relay protection] Rukovodiashchie ukazaniia po releinoi zashchite. Moskva, Gosenergoizdat. No.2. [Zero-sequence notching current protection from contact to ground of 110-220 kv. lines] Stupenchataia tokovaia zashchita nulevoi posledovatel'nosti ot zamykanii na zemliu linii 110-220 kv. 1961. 62 p. (MIRA 15:7)

(Electric protection)

FEDOSEYEV, Aleksey Mikhaylovich; YERMOLENKO, V.M., retsenzent; DROZDOV, A.D., retsenzent; MERZHANOV, A.K., red.; LARIONOV, G.Ye., tekhn. red.

[Principles of relay protection] Osnovy releinoi zashchity. Izd.2., perer. Moskva, Gos.energ.izd-vo, 1961. 439 p. (MIRA 15:2)

1. Zaveduyushchiy kafedroy elektricheskikh stantsii i setey Novocherkasskogo politekhnicheskogo instituta (for Drozdov). 2. Zaveduyushchiy kafedroy avtomatizatsii i releynoy zashchity Moskovskogo energeticheskogo instituta (for Yermolenko).
(Electric power distribution) (Electric protection)
(Electric relays)

MERZHANOV, A.K., dotsent

Current distribution in a network containing a two-winding transformer with a load in the outer and middle wires of its secondary winding. Izv. vys. ucheb. zav.; energ. 7 no.2: 17-23 F '64. (MIRA 17:3)

1. Moskovskiy ordena Lenina aviatsionnyy institut imeni S. Ordzhonikidze.

MERZHANOV, B.M.

Wardrobes from chipboards serving as partitions. Der. prom. 12 no.4:18-20 Ap '63. (MIRA 16:10)

MERZHANOV, Grigoriy Sergeyevich; STEBUNOV, N.S., red.; MISHNAYEVSKAYA, G.V., mlad. red.

[Balance sheet compilation in planning and accounting; methodological instructions, schedules, and calculations] Balansovye raschety v planirovanii i uchete; metodicheskie ukazaniia, skhemy, raschety. Moskva, Ekonomika, 1964. 142 p. (MIRA 17:10)

USSR/Colloid Chemistry. Dispersion Systems B-14

Abs Jour : Ref Zhur - Khimiya, No 8, 1957, 26427

Author : K.M. Merzhanov, N.I. Peterimova, N.S. Smirnov
Title : Influence of Ionization of Air on Dispersion Phase of Aerocolloids.

Orig Pub : Kolloid. zh., 1956, 18, No 5, 574-577

Abstract : The influence of the ionization of air on the dispersion phase of a natural aerocolloid was studied. Ultraviolet and x-rays and α-particles served as sources of ionization. The irradiation of air was carried out in chambers, the volume of which was from 0.8 to 2 cub.m. The concentration of particles was determined ultramicroscopically in a flow. At the concentration of up to 10^5 or 10^7 pairs of ions per cub-cm in ordinary air with the relative humidity up to 100%, the concentration of ultramicroscopic particles increased 3 to 4 times, and the number of nuclei of condensation increased over 10 times. The concentration of particles rises together with the irradiation duration and the ionization degree; the size of particles increases together with the concentration rise.

Card : 1/1

MERZHANOV, K.M.

Formation of crystalline particles in expansion chambers at temperatures < -40° (centigrade). Izv. AN SSSR. Ser. geofiz. no.12:1852-1861 D '61. (MIRA 14:12)

1. Institut prikladnoy geofiziki AN SSSR.
(Cloud physics)

MERZHANOV, K.M.

Formation of ice crystals in supersaturated water vapor.
Koll. zhur. 27 no.4:556-562 Jl-Ag '65. (MIRA 18:12)

1. Institut fizicheskoy khimii AN SSSR, Moskva. Submitted January 21, 1964.

MERZHANOV, Miron Tarasovich.

Proizvodstvo vagonov./Manufacture of cars/. Dopushcheno v kachestve uchebnogo posobiia dlia vozov mashinostroeniia. Moskva, Gos. mauch.-tekhn. izd-vo mashinostroit. lit-ry, 1948. 490 p. illus.

"Literatura": p./483/.

MH

DLC: TF375.M4

SO: Soviet Transportation and Communications, A Bibliography, Libr ry of Congress Reference Department, Washington, 1952, Unclassified.

MEYERSON, F.Z.; DMITRIYEVA, T.M.; MERZHANOVA, G.Kh.

Role of the vegetative section of the nervous system in the mechanism of the compensatory hyperfunction of the heart. Trudy Inst. norm. i pat. fiziol. AMN SSSR 6:123-125 '62. (MIRA 17:1)

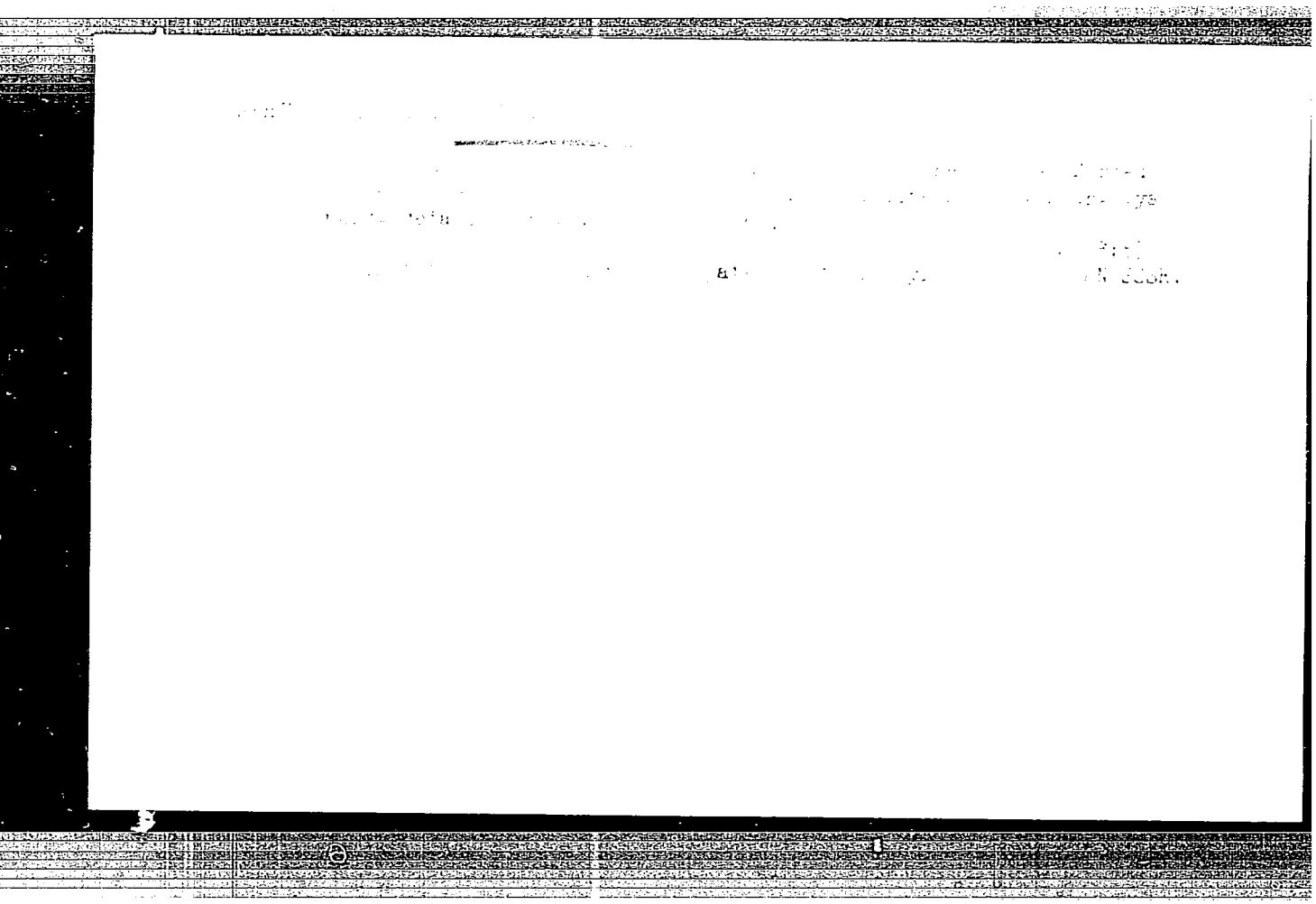
1. Laboratoriya fiziologii i patologii serdtsa (zav. deystvitel'nyy chlen AMN SSSR prof. V.V. Parin) Instituta normal'noy i patologicheskoy fiziologii AMN SSSR.

SAKHIULINA, G.T.; MERZHANOVA, G.Kh.

Changes in the recruiting response of dogs in the process of conditioned reflex formation. Dokl. AN SSSR 151 no.4:989, 3 of cover Ag '63. (MIRA 16:8)

1. Institut vysshey nervnoy deyatel'nosti i neyrofiziologii AN SSSR. Predstavleno akademikom V.N.Chernigovskim.

(CONDITIONED RESPONSE)



DREYZIN, S.A., kand.meditsinskikh nauk; MERZHANOVA, T.F., kand.meditsinskikh nauk; YAKUBOVA, U.Ya., kand. meditsinskikh nauk

Results of sanitary-hygienic investigation of new multistory apartment in Tashkent. Gig.i san. 24 no.12:73-74 D '59. (MIRA 13:4)

1. Iz kafedry kommunal'noy gigiyeny Tashkentskogo meditsinskogo instituta.

(HOUSING)

S/117/60/000/006/009/010
A004/A002

AUTHOR: Merzhanova, V.M.

TITLE: Results and Plans (On the Work of the Metal Science Section of the Central Administration of NTO Mashprom)

PERIODICAL: Mashinostroitel', 1960, No. 6, p. 44

TEXT: The author reports on the scientific activities of the Section of Metal Science and Heat Treatment of the Central Administration in 1959. In June 1959, the section, together with the GNTK of the Council of Ministers of the USSR, convened an All-Union scientific and technical Conference on the theme "The Present State and Ways of Development of Heat-Treatment Technology and Equipment of Heat-Treatment Shops", in which some 700 people from all the more important towns of the Soviet Union participated. 34 reports were read at the conference. The representative of the zavod imeni Likhacheva (Plant imeni Likhachev), Koshelev, reported on the utilization of residual forging heat for the heat treatment of forgings. Astaf'yev, Candidate of Technical Science, read a report on "The Heat Treatment of Large-Sized Forgings", in which he reported on the heat-treatment practice of the Novokramatorskiy zavod tyazhelogo

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Results and Plans (On the Work of the Metal Science Section of the Central Administration of NTO Mashprom)

mashinostroyeniya (Novokramatorsk Plant of Heavy Machinery). The Chief Metallurgist of the Plant imeni Likhachev, Assonov, suggested to revise the obsolete ideas on high-temperature heating being a factor deteriorating the mechanical properties of steel. The report of Candidate of Technical Science, Golovin, (NIITVCh), was devoted to the most advanced heat-treatment method, i.e. h.f. current heating, while the Candidate of Technical Sciences Shepelyakovskiy (Plant imeni Likhachev) treated the same subject. Professor Vishnyakov, Doctor of Technical Sciences, and Sokolov, Candidate of Technical Sciences, reported on the mechanization and automation of equipment of heat-treatment shops. The Conference, in its resolution, remarked upon a certain backwardness in the development of heat-treatment technology. Moreover, the author reports that the Section of Metal Science in 1959 had organized two competitions, the Competition imeni D.K. Chernov and the Competition imeni N.A. Minkevich, dealing with problems of metal science and heat treatment. 49 people participated in the two competitions. In 1959, a permanent Seminar on ultrasonics was established with the Section, while its scientific personnel acts as consultants of plants and scientific research institutes. Thus, Yu.M. Lakhtin, Doctor of Technical Sciences, supervises the

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introduction of anti-corrosive nitriding at the Moskovskiy zavod "Dinamo" (Moscow "Dinamo" Plant) and is a permanent consultant of the workers of the Tekhnologicheskiy institut imeni Dzerzhinskogo (Technological Institute imeni Dzerzhinskiy) on the problem of hardening components operating at high temperatures. A.A. Shmykov, Doctor of Technical Sciences, is a consultant of the Minskiy traktornyy zavod (Minsk Tractor Plant) and of the Magadanskiy promkombinat (Magadan Promkombinat). The author gives a survey of the plans of the Metal Science Section in 1960.

Card 3/3

MERZHANOVA, Ye.; MIKHAYLOV, A.; VOL'KENSON, G.

Competitions. NTO no.7:39-40 Jy '59. (MIRA 12:11)

1. Instruktor sektsii metallovedeniya i termoobrabotki TSentral'nogo pravleniya nauchno-tekhnicheskogo obshchestva mashinostroitel'noy promyshlennosti (for Merzhanova).
(Research, Industrial--Competitions)

S/129/60/000/04/019/020
E073/E535

AUTHOR: Merzhanova, Ye. M., Engineer

TITLE: Results of the 1959 All Union Competition for the Prizes imeni D. K. Chernov, N. A. Minkevich and P. G. Sobolevskiy

PERIODICAL: Metallovedeniye i termicheskaya obrabotka metallov, 1960, No 4, pp 62-64 (USSR)

ABSTRACT: Seventy people participated. None of the papers qualified for the first D. K. Chernov prize. The second prize was awarded to Doctor of Technical Sciences Professor G. I. Pogodin-Alekseyev and Candidate of Technical Sciences V. V. Zaboleyev-Zotov for their work "Application of ultrasonics in the manufacture and heat treatment of alloys", a paper devoted to the influence of ultrasonics on the structure and properties of alloys. It is stated that the results of this work have considerable practical importance. The second imeni D. K. Chernov prize was also awarded to Doctor of Technical Sciences A. M. Borzdyk for his

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E073/E535

Results of the 1959 All Union Competition for the Prizes imeni D. K. Chernov, N. A. Minkevich and P. G. Sobolevskiy

work on long duration plasticity of steels and alloys at elevated temperatures; as a criterion for long duration plasticity he proposes using the total deformation accumulated by the metal towards the end of the second stage of creep. He also made proposals on extrapolating the total deformation during the first and second stages of creep on the basis of the "stress-time from the beginning of the third period" in logarithmic plots. Experimental results indicate that the elongation at the beginning of the third period is 0.3 to 0.1 of the total elongation during fracture and is directly dependent on it.
The third D. K. Chernov prize was awarded to Candidates of Technical Sciences B. I. Medovar and Yu. B. Malevskiy (Institute of Electric Welding imeni Academician Ye. O. Paton) for comprehensive investigations devoted to the formation of the σ-phase in the

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E073/E535

Results of the 1959 All Union Competition for the Prizes imeni D. K. Chernov, N. A. Minkevich and P. G. Sobolevskiy

austenitic steel Kh25N20 and in weld seams of this steel. This prize was also awarded to Candidate of Technical Sciences A. V. Stanyukovich (Central Boiler-Turbine Scientific Research Institute imeni I. I. Polzunov) for his work on "Investigation of the ductility properties of refractory steels" (under conditions of long duration operation at elevated temperatures and subjected to external loads).
Furthermore, the following works were commended: Candidate of Phys.-Mat. Sciences V. Ye. Neymark (TsNIIChermet) "Investigation of the influence of inoculation agents on the process of crystallization of metals and alloys and on obtaining cast components by the method of vacuum crystallization"; Doctor of Technical Sciences V. D. Taran and Candidate of Technical Sciences L. P. Skugorova (Moscow Institute of Petro-chemical and Gas Industries) "Properties of borated layers of low alloy constructional steels";

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Results of the 1959 All Union Competition for the Prizes imeni D. K. Chernov, N. A. Minkevich and P. G. Sobolevskiy

Doctor of Technical Sciences Professor M. P. Braun, Engineer B. B. Vinokur (Foundry Institute, Academy of Sciences, UkrSSR), A. A. Geller, A. I. Kondrashov and K. F. Gurzhiyenko (Novo-Kramatorsk Engineering Works) "New Constructional Steel for Large Forgings". The first prize imeni N. A. Minkevich was awarded to Engineers N. A. Kulakov, I. M. Sergeychev, P. I. Lipatnikov, V. F. Vykhukholev, Doctor of Technical Sciences Professor M. Ye. Blanter, Engineers S. D. Faynbron, T. A. Mikhin and V. A. Livanov for the work "Semi-automatic equipment for quenching large die stamps (20 to 25 tons) in a water-air mixture". The second Minkevich prize was awarded to Doctor of Technical Sciences Professor I. V. Paisov and Candidate of Technical Sciences P. A. Dudovtsev (Moscow Steel Institute) for the work "Introduction of a high strength engineering steel for special equipment" and to

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Doctor of Technical Sciences Professor M. G. Lozinskiy (Institute of Mechanical Engineering, Academy of Sciences USSR) for his monograph "Industrial applications of induction heating".
The third Minkevich prize was awarded to Doctor of Technical Sciences Professor Yu. A. Geller, Engineers Ye. A. Lebedeva, Ts. L. Olesova (VNII), G. G. Korolev, B. A. Aleksandrovich, Krasnopol'skiy and A.G.Klyuyeva ("Frezer" Works) for the work "Development of new tool materials and investigation of the technological regimes of the properties of low alloy tool steels for substituting the steel 9KhS" and also to Engineers V. A. Dusman and I. N. Tolokonskiy (VNITIPribor) for their work "Mechanized caroussel type furnace for quenching very small components".
Commendations were awarded to Engineers P.S.Plekhanov, L. Ya. Kravchenko and V. A. Koshkin (Kuznetsk Metallurgical Combine) for their work "Increasing the

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E073/E535

Results of the 1959 All Union Competition for the Prizes imeni D. K. Chernov, N. A. Minkevich and P. G. Sobolevskiy

strength and the wear resistance of railroad rails by quenching them in oil"; to Engineers Ya. I. Derbenev and Ye. N. Baranova (Saratov Works "Serp i molot") for their work "Automatic quenching of the pins of tracks and other components" and to Engineers V.D. Buyadzhi and D. S. Gil'gur (Odessa Works for Agricultural Machinery) for their work "Design of automatic machine for hardening spanners".
None of the papers submitted qualified for the first P. G. Sobolevskiy prize. The second prize was awarded to Candidate of Technical Sciences V.S.Rakovskiy, Engineers V. V. Zhukov and R. F. Kostechko for their work "Cermet friction materials", and to Engineers V. V. Saklinskiy, A. A. Kokorev, S. K. Belova, I. I. Monakhov, A. S. Sarvina, N. S. Zorina, V.A.Khazov, V. P. Pshennov, Yu. A. Ignat'yev (NIIAvtoprom) for their work "Development and Introduction of Technological

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S/129/60/000/04/019/020
E073/E535

Results of the 1959 All Union Competition for the Prizes imeni D. K. Chernov, N. A. Minkevich and P. G. Sobolevskiy

Process of Manufacture of Cermet Components for the Automobile Industry".
The third prize was awarded to Doctor of Technical Sciences Professor G. I. Aksenov, Engineers Yu.N.Semenov, G. N. Gribova and V. I. Shchekin (Gor'kiy Polytechnic Institute) for their work "Development of a technology for producing nickel strip by rolling powder" and "Development of a technology for manufacturing porous metallic sheets for filters" and to Doctor of Technical Sciences Professor G. V. Samsonov (Institute for Cermets and Special Alloys, Academy of Sciences, UkrSSR) for the monograph "Silicides and their applications in engineering" which is the first Soviet work dealing comprehensively with the nature and properties of silicides of high melting point metals.
Commendations were made to Engineers Yu. N. Semenov, G. S. Shmakov and L. A. Yablokova for their work

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S/129/60/000/04/019/020
E073/E535

Results of the 1959 All Union Competition for the Prizes imeni D. K. Chernov, N. A. Minkevich and P. G. Sobolevskiy

"Development of a technology of manufacture of new cermet electro-erosion resistant and refractory alloys for electrode applications".

Card 8/8

MERZHANOVA, Ye.M.

Results and plans. Mashinostroitel' no.6:44 Je '60.
(MIRA 13:8)
(Metallography—Research)

MERZHAYEVSKAYA, O.I. [Merzhaevskaia, O.I.]

A study of noctuid moths (Lepidoptera, Noctuidae) of the White Russian S.S.R. Vestsi AN BSSR. Ser. biial. nav. no. 2:51-69 '58. (MIRA 11:8)

(White Russia--Moths)

MERZHEYEVSKAYA, O.I.

Food specialization in the owlet moths Polia oleracea L. and P. dissimilis Knoch. Zool. zhur. 40 no.5:707-714 '61.
(MIRA 14:5)

1. Department of Zoology, Academy of Sciences of the Byelorussian S.S.R. (Minsk).
(Owlet moths)
(Insects--Food)

MERZHEYEVSKAYA, O.

Effect of peat and mineral soil nematodes on farm crops. Sbor.nauch. trud.Inst.biol.AN BSSR no.1:155-170 '50. (MLRA 9:1)
(Nematoda)

MERZHEYEVSKAYA, O.I., kandidat biologicheskikh nauk.

New nematode species.Sbor.nauk.trud.Inst.biol.AN BSSR no.2:112-120 '51. (MLRA 9:1)

(Nematoda)

MERZHEYEVSKAYA, O. I.

Nematody glavneishikh polevykh kul'tur BSSR [Nematoda of the principal field crops in the White Russian S.S.R.]. Minsk, Izd-vo AN BSSR, 1953. 192 p

SO: Monthly List of Russian Accessions, Vol 6 No 8 November 1953

MERZHEYEVSKAYA, O.I.

Nematodes of farm plants of White Russia. Trudy probl. i tem. soveshch. no.3:182-185 '54. (MIRA 8:5)

1. Institut biologii Akademii nauk Belorusskoy SSR.
(White Russia--Nematoda) (Nematoda--White Russia)

KIR'YANOVA, Ye.S.; GERASIMOV, B.A.; MERZHEYEVSKAYA, O.I.; POGOSYAN, E.Ye.

Appendix 3: Recommendation for combating the onion bulb eelworm (Ditylenchus allii (Beijerinck, 1883)). Trudy probl. i tem.soveshch. no.3:255-257 '54. (MLRA 8:5)

1. Zoologicheskiy institut Akademii nauk SSSR, Nauchno-issledovatel'skii institut ovoshchnogo khozyaystva, Institut biologii Akademii nauk Belorusskoy SSR, Zoologicheskiy institut Akademii nauk Armyanskoy SSR.
(Nematoda) (Onions--Diseases and pests)

MEBZHEYEVSKAYA, O.I.

Materials for a study of insect pests of grain crops in Polesye. Izv. AN BSSR no.3:109-117 My-Je '55. (MLRA 8:12)
(Grain--Diseases and pests) (Polesye--Insects, Injurious and beneficial)

MERZHEYEVSKAYA O.I.

MERZHEYEVSKAYA, O.I.

Materials for studies of noctuid moths (Lepidoptera, Noctuidae) in the White Russian S.S.R. Izv. AN BSSR no.6:121-124 N-D '55. (Owlet moths) (MLRA 9:6)

E V
MERZHAYEVSKAYA, O.I.

Winter moth (Agrotis segetum schiff.) in western White Russia.
Vestsi AN BSSR Ser,biial.nav.no.1:87-96 '56. (MIRA 9:9)
(White Russia--Cutworms)

MERZHEYEVSKAYA, O.I. [Merzhaeuskaia, O.I.]; KHATKO, E.I. [Khats'ko, E.I.]

Development of the owlet moths Polia oleracea L. and P. dissimilis Knoch. in White Russia. Vestsi AN BSSR. Ser. biial. nav. no. 4:125-136 '60. (MIRA 14:1)
(White Russia--Owlet moths)

MERZHEYEVSKAYA, O.I. [Merzhaevskaia, O.I.]; KHATKO, E.I. [Khats'ko, E.I.]

Some data on the feeding of owlet moths Polia oleracea L. and P. dissimilis Knoch. Vestsi AN BSSR. Ser. biial nav. no.2:106-115 '61. (MIRA 14:7)

(OWLET MOTHS) (INSECTS--FOOD)

MERZHEYEVSKAYA, O.I.

Instar changes in larvae of the owlet moths Polia cleracea L. and P. dissimilis Knoch. Zool. zhur. 40 no.6:859-864 Je '61. (MIRA 14:6)

1. Department of Zoology, Academy of Sciences of the Bielorussian S.S.R., Minsk.
(Owlet moths) (Larvae—Insects)